IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
AUSTIN DIVISION

THE QUANTUM WORLD CORPORATION,
Plaintiff,

-vs-

Case No. A-11-CA-688-SS

DELL INC., et al.,
Defendants.

SUPPLEMENTAL *MARKMAN* ORDER

BE IT REMEMBERED on this day the Court reviewed the file in the above-styled cause, and specifically Plaintiff The Quantum World Corporation's Supplemental *Markman* Brief [#289], Defendant Dell Inc.'s Supplemental *Markman* Brief [#290], the First Supplemental Report and Recommendation of the Special Master Regarding U.S. Patent No. 7,096,242 [#293], and Quantum World's Objections [#296]. Having reviewed the documents, the governing law, and the file as a whole, the Court now enters the following opinion and orders OVERRULING the objections and ACCEPTING the Special Master's recommended construction.

Background

This claims construction order addresses a recently revealed dispute between Plaintiff The Quantum World Corporation and Defendant Dell Inc. over the proper construction of one particular term in United States Patent Number 7,096,242 (the '242 Patent). The '242 Patent was added to this patent infringement lawsuit by the agreement of the parties in March 2013, nearly three years after the case was filed. *See* Order of Mar. 19, 2013 [#216]. In June 2013, the Court adopted agreed

constructions of several claim terms and cancelled a supplemental[1] *Markman* hearing scheduled at the parties' request. *See* Order of June 20, 2013 [#230]. In March 2014, some of the parties' numerous *Daubert* motions revealed their ongoing disagreement over the term at issue here, despite the parties' previous agreements. As a result, the Court ordered supplemental briefing and enlisted the services of Special Master Karl Bayer once more to resolve the parties' claim construction dispute in advance of the parties' July 2014 trial setting.

The '242 Patent, entitled "Random Number Generator and Generation Method," is a division of the application which became one of the original patents-in-suit, the '364 Patent. It was added to this case after the United States Patent and Trademark Office's Patent Trial and Appeal Board issued a decision reversing in part the patent examiner's previous rejection of all claims in the '242 Patent and confirming claims 22 through 25. Like all of the patents in its family, the '242 Patent concerns random number generators used in computers. Random number generators are used in a wide variety of applications such as computer modeling and cryptography. The parties' dispute concerns a term in claims 22 and 25 of the '242 Patent[2] concerning the quality of the random numbers generated by the invention.

Claim 22 discloses:

A true random number generator system comprising:

a hardware device for producing a binary true random sequence of signals; and

a computer for utilizing said binary true random sequence of signals;

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[1] The Court previously conducted a *Markman* hearing and issued a *Markman* order construing several claims in the two other patents asserted in this lawsuit, United States Patent Numbers 6,763,364 (the '364 patent) and 7,752,247 (the '247 patent). *See* Order of Aug. 29, 2012 [#183].

[2] Claims 23 and 24 are dependent on claim 22.

> wherein $|B_2| \leq 0.002$ and $|SD(t)| \leq 0.0004$, where $|B_2|$ is the fractional bias in the 1, 0 probability of said binary true random sequence of signals and SD(t) is the serial dependence as a function time of said binary true random sequence of signals.

'242 Patent, col.30, ll.58–67.

Similarly, Claim 25 discloses:

> A method of producing a series of high-quality true random numbers, said method comprising the steps of:
>
> producing a binary true random sequence of signals in which $|B_2| \leq 0.002$ and $|SD(t)| \leq 0.0004$, where $|B_2|$ is the fractional bias in the 1, 0 probability of said binary true random sequence of signals and SD(t) is the serial dependence as a function time of said binary true random sequence of signals;
>
> interfacing said binary true random sequence of signals to a computer; and
>
> utilizing said binary true random sequence of signals in said computer.

Id. col.31, l.5–col.32, l.7.

The parties' dispute concerns the lengthy term "$|B_2| \leq 0.002$ and $|SD(t)| \leq 0.0004$, where $|B_2|$ is the fractional bias in the 1, 0 probability of said binary true random sequence of signals and SD(t) is the serial dependence as a function time of said binary true random sequence of signals," used in both claims, which describes the "bias"[3] and "serial dependence"[4] of the "binary true random

[3] The output of the random number generator is a binary sequence, meaning a sequence of numbers with each digit being either 1 or 0 (e.g., 01000010). "Bias" (described by the equation p(x), where x=0 or 1) refers to "the average probability of a '0' or '1' occurring in the [binary random sequence]." '242 Patent, col.26, ll.5–7. According to the patent, a truly random sequence has a bias of p(1)=0.50, meaning the probability of a 0 occurring is equal to the probability of a 1 occurring. *Id.* col.26, ll.8–9.

[4] "Serial dependence" (described by the equation SD(t)) refers to "the dependence of the value for a binary pulse on the values of the binary pulses adjacent to it in a serial sequence as a function of the time between pulses." '242 Patent col.26, ll.2–5. In other words, serial dependence describes a correlation between a given digit in the sequence and the digits on either side of it. *See* Order of June 19, 2013 [#230] (order adopting parties' agreed construction of certain terms in the '242 Patent), at 2 ("The term 'SD(t)' means 'the dependence of the values in a binary sequence on adjacent values in the sequence. This is equivalent to the autocorrelation of adjacent binary values in said sequence.'"). According to the patent, a truly random sequence has a serial dependence of SD(t)=0, meaning the output of each digit is not correlated with its adjacent digits.

sequence of signals."

Special Master Bayer issued his Report and Recommendation on April 1, 2014, recommending the Court adopt Dell's proposed construction. Quantum World is entitled to de novo review of all factual findings and conclusions of law to which it has specifically objected. FED. R. CIV. P. 53(f).

Analysis

I. Claim Construction—Legal Standard

When construing claims, courts begin with "an examination of the intrinsic evidence, i.e., the claims, the rest of the specification and, if in evidence, the prosecution history." *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002); *see also Interactive Gift Express, Inc. v. Compuserve Inc.*, 256 F.3d 1323, 1327 (Fed. Cir. 2001).

The words in the claims themselves are of primary importance in the analysis, as the claim language in a patent defines the scope of the invention. *SRI Int'l v. Matsushita Elec. Corp.*, 775 F.2d 1107, 1121 (Fed. Cir. 1985) (en banc). The words of a claim "are generally given their ordinary and customary meaning." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005). "[T]he ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application."[5] *Id.* at 1313. The inquiry into how a person of ordinary skill in the art understands a claim term provides an "objective baseline" from which to begin claim interpretation. *Id.* The person of ordinary skill in the art is understood to read a claim term not only in the context

[5] This hypothetical person is now commonly referred to simply as an "ordinarily skilled artisan." *E.g.*, *Power Integrations, Inc. v. Fairchild Semiconductor Int'l, Inc.*, 711 F.3d 1348, 1365–66 (Fed. Cir. 2013).

of the particular claim in which the term appears, but in the context of the entire patent, including the specification; thus, both the plain language of the claims and the context in which the various terms appear "provide substantial guidance as to the meaning of particular claim terms." *Id.* at 1314.

The specification also plays a significant role in the analysis. *Id.* at 1315. The Federal Circuit has repeatedly reaffirmed the principle that the specification "'is always highly relevant . . . . Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.'" *Id.* (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). In interpreting the effect the specification has on the claim limitations, however, courts must pay special attention to the admonition that one looks "to the specification to ascertain the meaning of the claim term as it is used by the inventor in the context of the entirety of his invention, and not merely to limit a claim term." *Interactive Gift*, 256 F.3d at 1332 (internal quotation marks and citations omitted).

The final form of intrinsic evidence the Court may consider is the prosecution history. Although the prosecution history "represents an ongoing negotiation between the PTO and the applicant" and therefore "often lacks the clarity of the specification and thus is less useful for claim construction purposes," it can nonetheless "often inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be." *Phillips*, 415 F.3d at 1317.

Aside from the intrinsic evidence, the Court may also consult "extrinsic evidence," which is "all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises." *Id.* While extrinsic evidence "can shed useful light on the relevant art," the Federal Circuit has explained it is "less significant than the intrinsic record

in determining 'the legally operative meaning of claim language.'" *Id.* at 1317 (quoting *C.R. Bard, Inc. v. U.S. Surgical Corp.*, 388 F.3d 858, 862 (Fed. Cir. 2004)). Extrinsic evidence in the form of expert testimony may be useful to a court for "a variety of purposes, such as to provide background on the technology at issue, to explain how an invention works, to ensure that the court's understanding of the technical aspects of the patent is consistent with that of a person of skill in the art, or to establish that a particular term in the patent or the prior art has a particular meaning in the pertinent field." *Id.* at 1318. However, conclusory, unsupported assertions by an expert as to the definition of a claim term are not useful, and should be discounted. *Id.* In general, extrinsic evidence is considered "less reliable than the patent and its prosecution history in determining how to read claim terms," although it may be helpful. *Id.*

The purpose of claim construction is to "'determin[e] the meaning and scope of the patent claims asserted to be infringed.'" *02 Micro Int'l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1362 (Fed. Cir. 2008) (quoting *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 976 (Fed. Cir. 1995), *aff'd*, 517 U.S. 370 (1996)). Thus, "[w]hen the parties raise an actual dispute regarding the proper scope of these claims, the court, not the jury, must resolve that dispute." *Id.* However, "district courts are not (and should not be) required to construe *every* limitation present in a patent's asserted claims." *Id.* For example, no construction is required if the requested construction would be "an exercise in redundancy," or if "the disputed issue is the proper application of a claim term to an accused process rather the scope of the term." *Id.* (internal quotation marks omitted).

II. Application

A. Special Master's Recommendations

The parties proposed differing constructions of the disputed term. Quantum World proposed the term be given its plain and ordinary meaning based on the previous constructions adopted by the Court. Quantum World also proposed giving the jury an additional instruction in the event the parties disputed the "plain and ordinary meaning" of the term (which they assuredly would): "B_2 and SD(t) are qualities of 'said binary true random sequence of signals,' which cannot be determined directly but which statistical analysis can estimate to be within a certain range with 95% confidence. This claim requirement is satisfied if B_2 and SD(t) are both estimated to be within the specified limits to a 95% degree of confidence." Dell proposed inserting the phrase "measured for said produced sequence" in two locations: once after the description of B_2, and once after the description of SD(t). Additionally, Dell proposed adding the following comment: "B_2 for the sequence is measured using the equation [N(1)–0.5N]/0.5N and SD(t) for the sequence is measured using the equation (S–D)/(N–1), where N is the length of the sequence, N(1) is the number of ones present in the sequence, S is the number of times adjacent pairs of bits are the same, and D is the number of times adjacent pairs of bits are different."

The Special Master recommended adopting Dell's proposed construction, not Quantum World's proposed construction. Accordingly, the Special Master's recommended construction of the disputed term is as follows:

Claim Term	Recommended Construction
"wherein $\|B_2\| \leq 0.002$ **and** $\|SD(t)\| \leq 0.0004$, **where** $\|B_2\|$ **is the fractional bias in the 1, 0 probability of said binary true random sequence of signals and SD(t) is the serial dependence as a function time of said binary true random sequence of signals"** ('242 Patent, Claim 22)	$\|B_2\| \leq 0.002$ and $\|SD(t)\| \leq 0.0004$, where B_2 is the fractional bias in the 1, 0 probability of said binary true random sequence of signals, **measured for said produced sequence**, and SD(t) is the serial dependence as a function of time of said binary true random sequence of signals, **measured for said produced sequence**.
"producing a binary true random sequence of signals in which $\|B_2\| \leq 0.002$ **and** $\|SD(t)\| \leq 0.0004$, **where** B_2 **is the fractional bias in the 1, 0 probability of said binary true random sequence of signals and SD(t) is the serial dependence as a function time of said binary true random sequence of signals"** ('242 Patent, Claim 25)	B_2 for the sequence is measured using the equation [N(1)–0.5N]/0.5N and SD(t) for the sequence is measured using the equation (S–D)/(N–1), where N is the length of the sequence, N(1) is the number of ones present in the sequence, S is the number of times adjacent pairs of bits are the same, and D is the number of times adjacent pairs of bits are different.

B. Objections

The heart of the parties' dispute is whether the term at issue, as used in claims 22 and 25, refers to the quality[6] of the true random number *generator*—e.g., the device itself—or instead refers to the quality of a finite-length sequence produced by the generator. Quantum advances the former interpretation, while Dell advances the latter. The Special Master recommended accepting Dell's construction. Quantum objects to that construction, raising generally the same arguments presented in its brief. For the following reasons, the Court OVERRULES Quantum World's objections and ACCEPTS the Special Master's recommended construction.

The "starting point in construing a claim term must be the words of the claim itself." *Takeda Pharm. Co. v. Zydus Pharms. USA, Inc.*, 743 F.3d 1359, 1363 (Fed. Cir. 2014). Here, the language

[6] Quality, in this instance, is measured in terms of bias and serial dependence.

of both claims 22 and 25 focuses not on the generator—a word noticeably absent from both claims—but on a specific sequence produced by the generator. '242 Patent, col.30, ll.59–60 ("a hardware device for producing *a binary true random sequence* of signals"); *id.* col.30, ll.61–62 ("a computer for utilizing *said binary true random sequence* of signals"); *id.* col.30, ll.63–67 ("where $|B_2|$ is the fractional bias in the 1, 0 probability *of said binary true random sequence* of signals and SD(t) is the serial dependence as a function time *of said binary true random sequence* of signals"); *id.* col.31, l.7–col.32, l.3 (claiming a method for "producing *a binary true random sequence* of signals . . . where B_2 is the fractional bias in the 1, 0 probability *of said binary true random sequence* of signals and SD(t) is the serial dependence as a function of time *of said binary true random sequence* of signals") (all emphasis added). Neither claim mentions the random number generator; claim 25 does not even mention the device. Both claims are also directed at the use of the sequence in a computer. *Id.* col.30, ll.61–62; col.32, ll.6–7. Finally, neither claim makes any mention of confidence levels to be used in a statistical analysis of the output of the device. Quantum World's proposed construction thus begins from a "starting point" divorced from the language of the claims themselves.

The claims alone are not sufficient to prove Dell's case, because "claims must be read in view of the specification, of which they are a part." *Phillips*, 415 F.3d at 1315 (internal quotation marks omitted). Here, the specification also supports Dell's contention the claims are directed at measuring bias and serial dependence of a given sequence, not of the generator. Most notably, the specification provides a mathematical equation for calculating bias: "B_2 is the fractional bias in the 1, 0 probability given by the equation: $B_2=[N(1)–0.5N)]/0.5N$ where N(1) is the number of 1's in a binary random sequence of length N." '242 Patent, col.4 ll.20–25. Thus, for any given sequence of

finite length, bias may be calculated, and the result is not a statistical confidence level but a specific number. The same is true for serial dependence, although the equation is more complicated.[7] When analyzing any finite-length sequence, statistical analysis is unnecessary because the equations provided by the specification allow direct calculation of the relevant numbers.

Confidence levels only enter into the mix when, as the specification discusses, one is attempting to estimate the quality of the generator by analyzing the theoretical, infinitely long sequence of numbers the generator could create if it ran for eternity (e.g, where N=∞). *See, e.g.*, *id.* col.26 ll.9–1 ("In practical terms, N cannot be infinite so, a real [binary random sequence] is instead defined in terms of probability confidence levels."). Quantum World's argument about the usefulness of confidence levels is, generally speaking, unobjectionable. It makes sense to evaluate the quality of the overall generator using confidence levels and sample sequences. The problem Quantum World encounters is that claims 22 and 25 do not discuss the generator, but instead discuss specific sequences produced by the generator. And the specification provides the equation for calculating the exact bias and serial dependence of those sequences.

Quantum World relies on the testimony of one of its experts to suggest an ordinarily skilled artisan would interpret the claims as referring to the generator and not a specific sequence. The expert claims that "[s]ince B_2 is the bias in the probability of generated bits, it is a property of the device itself and cannot be measured directly." Pl.'s Br. [#289-6], Ex. 4 (Melvin Report) ¶ 18. This testimony is contrary to the claim language and the specification, which define B_2 with reference to a specific sequence and provide an equation for directly measuring the bias of a given sequence.

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[7] Specifically, serial dependence is calculated using the bias number after that number has been run through an "EXCLUSIVE OR (XOR)" error correction mechanism. '242 Patent, col.4, ll.10–28 (giving the equation "B_2*=-SD(1)," where "the star, *, indicates the statistic at the output of each level of XOR error correction").

Even if the Court were to look beyond the plain language of the patent to expert testimony, Quantum World's proposed construction, as Quantum World would interpret it, would be inconsistent with the intrinsic evidence.

Quantum World uses a pair of coin-flipping analogies in an attempt to bolster their case. If one were to run an experiment where a weighted (biased) coin and a "fair" coin were each flipped ten times in a row, a single set of results would not necessarily tell you which coin was which. In any given set of ten flips, even the fair coin could, statistically speaking, come up "heads" ten times, while the weighted coin could strike a possible, though statistically improbable, even balance. If one were to look only at one set of results, one might incorrectly conclude the fair coin was biased and vice versa.

In this analogy, the coins are the generators, and the sets of results are the sequences. The problem with Quantum World's analogy is not its logic, which is sound. The problem is that the claim terms here *could have* required one to analyze five, or ten, or two hundred sample sequences of fifty or five-hundred or ten-thousand bits, but did not do so. Instead, the claims require calculation of the bias and serial dependence of "the sequence" produced by the generator, and provide specific equations for calculating those numbers. The fact the instructions provided in the claim language may result in occasional misidentification of the "coins" is not a justification for redrafting the claims to better fit the patentee's intent. *See K-2 Corp. v. Salomon S.A.*, 191 F.3d 1356, 1364 (Fed. Cir. 1999) ("Courts do not rewrite claims; instead, we give effect to the terms chosen by the patentee.")

Quantum World's objections fault the Special Master's recommended construction because, in Quantum World's view, it raises too many unanswered questions regarding the specific sequence

to be measured. How does one choose which sequence to measure, or its length? How many segments must be tested? These are legitimate questions, and ones which could have been addressed by the patent claims directed at measuring the bias of "a binary true random sequence of signals." '242 Patent, col.30, ll.59–60. But the mere fact the claims lack detail about the specifics of the sequence they discuss is not a reason to rewrite the claims to apply to the generator rather than the sequence. *See Chef Am., Inc. v. Lamb-Weston, Inc.*, 358 F.3d 1371, 1374 (Fed. Cir. 2004) ("This court . . . repeatedly and consistently has recognized that courts may not redraft claims, whether to make them operable or to sustain their validity.").

The Federal Circuit's opinion in *Chef America* provides a useful comparison. In that case, Chef America's patent described a process for producing dough products which could be finished in an oven or microwave to achieve a desirable crispy, flaky texture. *Id.* at 1372. One of the steps of the claimed process involved "heating the resulting batter-coated dough to a temperature in the range of about 400° F. to 850° F. for a period of time." *Id.* "The problem is that if the batter-coated dough is heated to a temperature range of 400° F. to 850° F., as the claim instructs, it would be burned to a crisp." *Id.* at 1373. What the patentee intended was clearly for the temperature in the *oven* to be within that range, thus baking the dough; heating the dough to such high temperatures would transform the products into "charcoal briquet[s]." *Id.*

Despite the obvious logic of Chef America's interpretation, the Federal Circuit held the claim required the dough itself to be heated to the stated temperatures. *Id.* at 1374. The court relied upon the plain language of the claims, which "mean exactly what they say." *Id.* at 1373; *see also id.* ("Nothing even remotely suggests that what is to be heated is not the dough but the air inside the oven in which the heating takes place. Indeed, *the claim does not even refer to an oven.*") (emphasis

added). The court was unmoved by the testimony of Chef America's "baking expert," who testified skilled bakers would understand the temperature ranges to be those of the oven and not the dough itself. *Id.* at 1375. Conceding its interpretation "result[ed] in a nonsensical construction of the claim as a whole," the court nevertheless "construe[d] the claim as written, not as the patentees wish they had written it." *Id.* at 1374 (internal quotation marks omitted).

The story is similar in this case. It is certainly possible to imagine claims drawn in the manner Quantum World suggests—in other words, claims which call for the measuring of the bias and serial dependence of the random number generator itself and do so using statistical confidence levels. Such a claim might look something like this:

> A system . . . wherein said true random number generator system provides random numbers having a $|B2| \leq 0.002$, $|SD(1)| \leq 0.0004$ and $|SD(2)| \leq 0.0004$ with a 95% confidence level, where B2 is the bias in the 1, 0 probability of the generator, SD(1) is the serial dependence for single sample periods and SD(2) is the serial dependence for two sample periods of the generator.

'247 Patent, col.29, l.47–col.30, l.5. Claims 22 and 25 of the '242 Patent are markedly different, and to ignore those differences would flout the Federal Circuit's command to interpret the claims as they were written. *Chef Am.*, 358 F.3d at 1374; *Process Control Corp. v. HydReclaim Corp.*, 190 F.3d 1350, 1357 (Fed. Cir. 1999) ("[W]e do not permit courts to redraft claims. . . . [W]e must construe the claims based on the patentee's version of the claim as he himself drafted it.").

Conclusion

The Court accepts the Special Master's recommended construction of the disputed term at issue in this supplemental claims construction matter. Accordingly,

IT IS ORDERED that Plaintiff The Quantum World Corporation's Objections [#296] are OVERRULED;

IT IS FINALLY ORDERED that the First Supplemental Report and Recommendation of the Special Master Regarding U.S. Patent No. 7,096,242 [#293] is ACCEPTED.

SIGNED this the 21st day of April 2014.

SAM SPARKS
UNITED STATES DISTRICT JUDGE